

ONTARIO WATER RESOURCES COMMISSION

Water pollution survey of the Village
of Cardinal, County of Grenville.

1964

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ONTARIO WATER RESOURCES COMMISSION

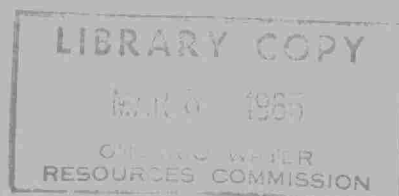
WATER POLLUTION SURVEY

OF THE

VILLAGE OF CARDINAL

COUNTY OF GRENVILLE

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THE
ONTARIO WATER RESOURCES
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WATER POLLUTION SURVEY
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THE
ONTARIO WATER RESOURCES
COMMISSION

Report on a
WATER POLLUTION SURVEY
of the
VILLAGE OF CARDINAL
in the
COUNTY OF GRENVILLE

Division of Sanitary Engineering
July 1964

WATER POLLUTION SURVEY
of the
VILLAGE OF CARDINAL

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WATER POLLUTION SURVEY
of the
VILLAGE OF CARDINAL

INTRODUCTION

A water pollution survey of the Village of Cardinal was performed on July 8, 1964. Surveys of this type are performed by the Ontario Water Resources Commission for the purposes of locating and recording sources of existing and potential water pollution. Enquiries and investigations are made with respect to outfalls which discharge to local watercourses and samples are collected to determine the significance of these outfalls and their effects on the receiving streams. Where pollution sources are noted, recommendations concerning their abatement are made to the parties concerned.

In addition to the data collected during the survey this report includes results of previous investigations of the sewage treatment facilities and the Canada Starch Company Limited plant as well as laboratory results of river samples collected during 1961, 1962, 1963 and 1964 at selected upstream and downstream sampling stations.

A map showing the pertinent details is appended.

PERSONS INTERVIEWED

The following officials were contacted:

Mrs. W. Strader, Municipal Clerk;
Mr. W. Gamble, Works Foreman.

THE VILLAGE OF CARDINAL

According to the 1964 Municipal Directory, the Village of Cardinal has a population of 1,990 and is 450 acres in size.

It is located on the banks of the St. Lawrence River near the eastern boundary of the County of Grenville. The New Galop Canal divides the village into a northern and a southern area with approximately equal populations.

SURFACE DRAINAGE

Storm water run-off in the northern section discharges to the New Galop Canal through several Department of Highways storm sewers.

In the southern area of the village surface run-off from the west section is directed to the Old Galop Canal by means of a storm sewer which terminates opposite Shanley Road, while another storm sewer conducts flows towards the St. Lawrence River east of the Canada Starch Company Limited plant from the east section.

No flow was noted in any of the storm sewers on the date of this inspection.

WATER SUPPLY

The source of supply is the St. Lawrence River. Water is supplied to the village from the Canada Starch Company Limited water works and is afforded pressure filtration and chlorination. Average daily consumption by the village has been estimated to be 360,000 gallons, while that for the factory has been estimated to be 6,840,000 gallons.

SEWAGE WORKS

Northern Area

The sanitary waste flows originating in the northern area are directed to the north septic tank, which is located

on the bank of the New Galop Canal near the east end of the village. The septic tank has a capacity of 30,000 gallons. A portion of the flow is pumped to the septic tank from a pumping station located near Adelaide and Walker Streets. By-pass or overflow arrangements were not provided at this pumping station.

Considering an average daily sewage flow of 70,000 gallons, based on an estimated contributing population of 1,000 and a per capita flow of 70 gallons per day, the theoretical retention time of the septic tank is 10.2 hours. A chlorine contact chamber included in the original installation has not to date been employed as such.

Southern Area

The sanitary sewer system serving the southern half of the village receives flows pumped from the Henry Street sewage pumping station as well as sanitary and industrial wastes pumped from the Canada Starch Company Limited plant. The septic tank, situated on the river bank near the east end of the village, has a capacity of 50,000 gallons. The Henry Street sewage pumping station is equipped with a stand-by gasoline driven pump. The overflow provided is not normally used.

The average daily sewage flow is indicated as 70,000 gallons from the business and residential sections and 435,000 gallons from the Canada Starch Company Limited, which represents a total flow of 505,000 gallons daily. The theoretical retention time based on the 50,000-gallon capacity

of the septic tank and the estimated daily flow is 2.4 hours.

Comments

A minimum of 24 hours retention time is usually allowed in the design of septic tank systems, which indicates that these systems are hydraulically overloaded. In addition, the normal accumulation of sludges would reduce the indicated retention times.

Earlier Commission reports indicate a less than 40 per cent 5-day BOD reduction provided by the northern system and negligible results obtained by the southern system. No improvement can be expected due to the population growth and therefore increased loadings on the systems. In view of this the municipality should proceed with the provision of improved treatment facilities.

INDUSTRY

The Canada Starch Company Limited is the only industry in the village. Corn starch and its related by-products are produced by the wet-milling process. Industrial wastes from the plant are discharged through three outfalls to the St. Lawrence River, while sanitary wastes as well as an estimated 435,000 gpd of industrial wastes containing 2,540 pounds of BOD and 1,700 pounds of suspended solids are pumped to the James Street sewer and thence to the south septic tank.

A report of investigations made during August and September, 1964, by the Industrial Wastes Branch of this Commission indicates that approximately 6 mgd of wastes are sewered to the St. Lawrence River containing 13,500 pounds

of 5-day BOD and 7,000 pounds of suspended solids. These waste loadings are consistent with those reported in 1962.

Wheat starch processing is under consideration at this plant, which reportedly may produce a higher strength of waste than that from corn starch processing operations. In view of the present strength and volume of the wastes, and considering the anticipated higher strength of waste to result from a wheat starch process, treatment of the wastes is necessary in order to meet OWRC objectives for effluent quality.

It would appear desirable to include the waste treatment requirements of the municipality in the proposals for the plant.

SAMPLING PROCEDURE

The sampling procedure, as established during previous surveys of the St. Lawrence River, included collection of upstream and downstream samples at the locations listed below and shown on the appended map.

SL. 67.05-B - New Galop Canal at west inlet

SL. 65.5-B - New Galop Canal 800 feet east of the north septic tank outfall

SL. 66.8 - St. Lawrence River at west inlet to Old Galop Canal

SL. 65.5-A - St. Lawrence River approximately 2,000 feet downstream of south septic tank outfall

At the time of this survey samples were collected at these locations and from the septic tank outfalls designated as SL. 65.6-CS and SL. 65.6-S.

All the analyses were performed at the OWRC laboratory in Toronto and the results are appended.

An interpretation and significance of the laboratory results are contained in an appendix to this report.

SAMPLE RESULTS

Deterioration of the waters of the canal and river is noted from comparison of the upstream and downstream sample results.

The septic tank effluent samples indicate the inadequacy of the treatment provided. Considering this, together with the excessive strength and volume of waste being discharged directly to the river from the Canada Starch Company Limited plant, improved sewage treatment facilities for both the municipality and the plant should be provided. As mentioned earlier it would appear desirable to include the waste treatment requirements of the municipality in the proposals for the plant.

SUMMARY AND CONCLUSION

A water pollution survey of the Village of Cardinal was conducted on July 8, 1964. This survey was conducted to assess the possible pollution of the waters of the St. Lawrence River in the vicinity of the Village of Cardinal. Samples of the septic tank outfalls and the receiving waters upstream and downstream of the village were collected at this time. These results together with those of previous investigations and river surveys, indicate inadequate treatment of wastes and the consequent deterioration of stream quality.

A separate investigation and report was prepared subsequent to this survey by the Industrial Wastes Branch of this Commission on the Canada Starch Company Limited. The report indicates that approximately 6 mgd of wastes are sewered to the St. Lawrence River containing 13,500 pounds of 5-day BOD and 7,000 pounds of suspended solids.

RECOMMENDATION

Officials of the Village of Cardinal and the Canada Starch Company Limited should proceed without delay on the provision of improved waste treatment facilities, preferably on a combined basis.

All of which is respectfully submitted,

District Engineer:


J. K. Theil

Approved by:


K. H. Sharpe, Director

Prepared by: A. D. McConnell

/mh

INTERPRETATION AND SIGNIFICANCE OF LABORATORY RESULTS

The analyses employed in this investigation to assess the quality of outfall discharges and surface waters were biochemical oxygen demand (BOD), suspended solids, and the total coliform count.

The BOD of sewage, industrial wastes, or polluted waters, is the oxygen required during stabilization (natural purification in a stream) of the decomposable organic or chemical material by aerobic biochemical action. A five-day BOD determination with incubation at twenty degrees Centigrade is reported. A high BOD is indicative of organic or chemical pollution. A desirable upper limit in surface water is four (4) parts per million (ppm).

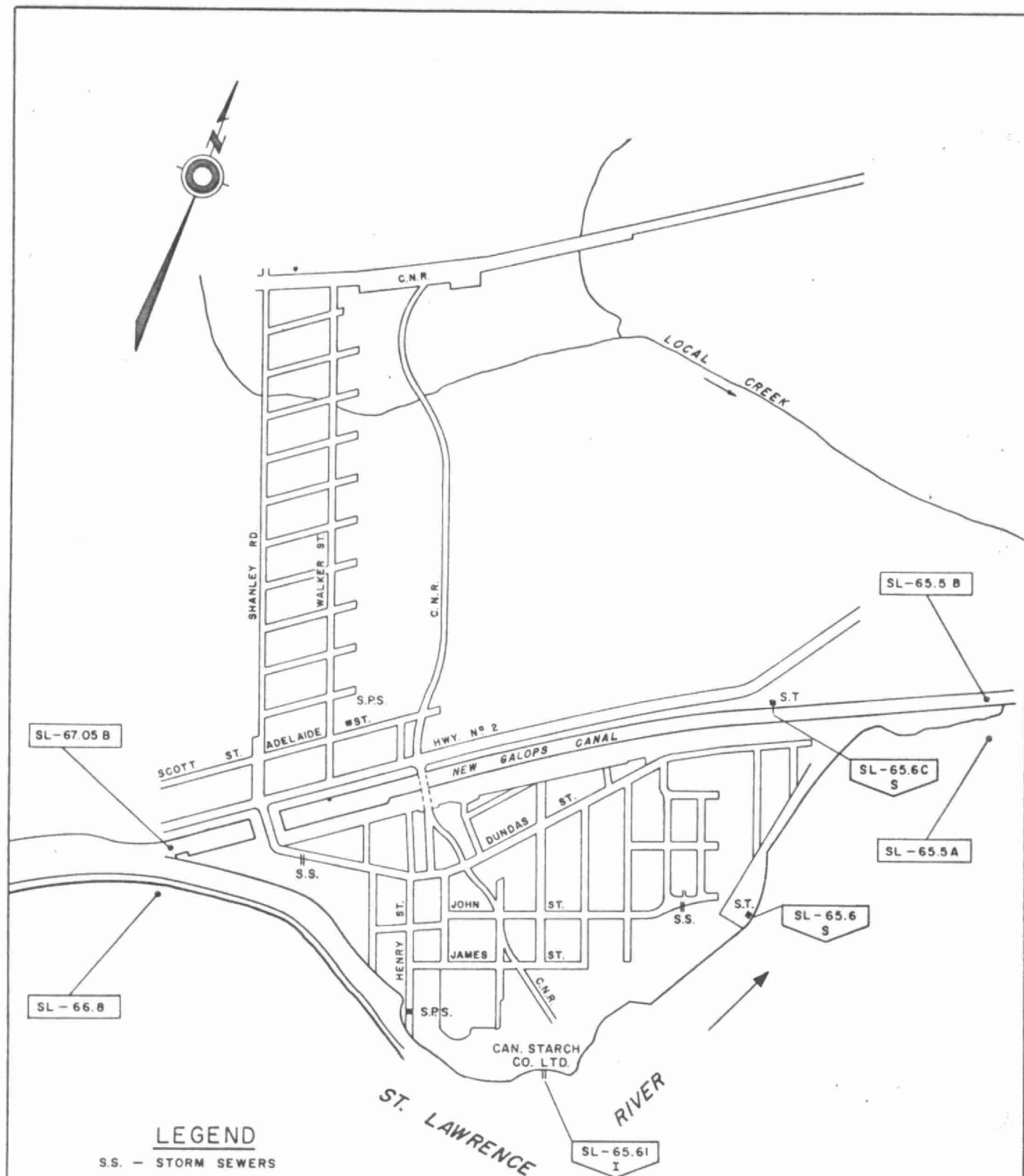
Suspended solids are reported in parts per million and indicate the measure of undissolved solids of organic or inorganic nature.

The total coliform count is employed to obtain an enumeration of coliform organisms, and the number is reported per 100 millilitres (ml) of the sample. The membrane filter technique was used in the examination of these samples. A maximum limit of 2,400 coliform organisms per 100 ml is the OWRC objective for the bacteriological quality of surface water in Ontario.

TABLE OF LABORATORY RESULTS

ALL ANALYSES ARE REPORTED IN PPM
UNLESS OTHERWISE INDICATED.

SAMPLE POINT NUMBER	DATE	DESCRIPTION	5-DAY		S O L I D S		TOTAL COLIFORMS/100 ML MEMBRANE FILTER
			BOD	TOTAL	SUSP.	DISS.	
SL. 67.05-B	AUG. 19/61	NEW GALOP CANAL AT WEST INLET	--	--	--	--	12
"	JULY 2/63	" " " " "	--	--	--	--	62
"	JULY 8/64	" " " " "	--	--	--	--	14
SL. 65.6-CS	NOV. 16/61	NORTH SEPTIC TANK OUTFALL	115	556	110	446	--
"	DEC. 4/62	" " " " "	88	560	61	449	13,000,000
"	MAY 29/63	" " " " "	84	670	92	578	20,000,000
"	JAN. 16/64	" " " " "	78	522	51	471	--
"	JULY 8/64	" " " " "	90	496	58	438	--
SL. 65.5-B	AUG. 19/62	NEW GALOP CANAL 800 FEET EAST OF NORTH SEPTIC TANK OUTFALL	--	--	--	--	3,200
"	DEC. 4/62	" " " " " " " " " " "	--	--	--	--	2,700
"	AUG. 22/63	" " " " " " " " " " "	--	--	--	--	2,800
SL. 66.8	AUG. 19/62	ST. LAWRENCE RIVER AT WEST INLET TO OLD GALOP CANAL	--	--	--	--	71
"	JULY 8/64	" " " " " " " " " " "	--	--	--	--	14
SL. 65.6-S	NOV. 16/61	SOUTH SEPTIC TANK OUTFALL	440	652	102	550	--
"	DEC. 4/62	" " " " "	84	302	54	248	310,000
"	MAY 29/63	" " " " "	700	1436	377	1059	93,000,000
"	JAN. 16/64	" " " " "	940	2614	272	2342	--
"	JULY 8/64	" " " " "	620	2086	382	1704	59,000,000
SL. 65.5-A	AUG. 19/62	ST. LAWRENCE RIVER APPROX. 2000 FEET DOWNSTREAM OF SOUTH SEPTIC TANK OUTFALL	--	--	--	--	6,300
"	DEC. 4/62	" " " " " " " " " " "	15	220	--	--	--
"	JULY 8/64	" " " " " " " " " " "	--	--	--	--	7,300
"	SEPT. 30/64	" " " " " " " " " " "	--	--	--	--	6,100



LEGEND

- S.S. - STORM SEWERS
- S.P.S. - SEWAGE PUMPING STATION
- S.T. - SEPTIC TANK
- SL-65.6C - SAMPLING POINT SHOWING STREAM AND MILEAGE
- SL-65.6 S - STREAM AND MILEAGE AT OUTFALL
- SL-65.6 I - TYPE OF OUTFALL

OUTFALL SYMBOL LETTERS

- S - SANITARY SEWER
- I - INDUSTRIAL

ONTARIO WATER RESOURCES COMMISSION

VILLAGE OF CARDINAL

WATER POLLUTION SURVEY

SCALE: 1" = 900' (APPROX.)

DRAWN BY: A.R.S.

DATE: OCT., 1964

CHECKED BY:

DRAWING N°: 64-78

JAN 25 1968

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